With great power comes great ability: Fitness relationships with Work Sample Test Battery performance in deputy sheriff recruits

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CALIFORNIA STATE UNIVERSITY FULLERTON

With Great Power Comes Great Ability: Fitness Relationships with Work Sample Test Battery Performance in Deputy Sheriff Recruits

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Acknowledgements

CSUF CENTER FOR SPORT PERFORMANCE TACTICAL RESEARCH

Los Angeles County Sheriff's Department

OKLAHOMA STATE UNIVERSITY

BOND UNIVERSITY TACTICAL RESEARCH UNIT

Introduction

- Law enforcement recruits are required to complete academy training (Lockie et al., 2018, 2019)
  - Establish patterns of behavior, values, attitudes
  - Teach procedures required for job
  - Ensure physical development to tolerate rigors of job
- 6-month process → physical training major component

Lockie, RG, Balfany, K, Bloodgood, AM, Moreno, MR, Cesario, KA, Dulla, JM, Dawes, JJ, and Orr, RM. The influence of physical fitness on reasons for academy separation in law enforcement recruits. *Int J Environ Res Public Health* 16: https://doi.org/10.3390/ijerph16030372, 2019.

Lockie, RG, Dawes, JJ, Balfany, K, Gonzales, CE, Beitzel, MM, Dulla, JM, and Orr, RM. Physical fitness characteristics that relate to Work Sample Test Battery performance in law enforcement recruits. *Int J Environ Res Public Health* 15: doi:10.3390/ijerph15112477, 2018.

Work Sample Test Battery (WSTB)

- State-mandated physical tests that are related to essential job tasks
- Can vary from state-to-state
- State of California Commission on Peace Officer Standards and Training
  - Agility run around a 99-yard obstacle course
  - Body drag with a 165-pound dummy
  - Climb over a six-foot chain link fence
  - Climb over a six-foot solid wall
  - 500-yard run

Lockie et al. (2018) → Fitness and WSTB

		99-yard Obstacle Course	Body Drag	Chain Link Fence Climb	Solid Wall Fence Climb	500-yard Run
Push-ups	*r* *p*	0.125 0.050	0.024 0.710	0.094 0.143	-0.053 0.412	-0.128* 0.045
Sit-ups	*r* *p*	-0.208* 0.001	-0.001 0.989	-0.175* 0.006	-0.203 0.001	-0.344* <0.001
Mountain Climbers	*r* *p*	-0.126 0.050	0.049 0.441	-0.020 0.757	-0.127* 0.048	-0.264* <0.001
Pull-ups	*r* *p*	-0.272* <0.001	-0.024 0.710	-0.315* <0.001	-0.309* <0.001	-0.372* <0.001
201-m Run	*r* *p*	0.127* 0.046	0.002 0.971	0.037 0.561	0.106 0.096	0.140* 0.029
2.4-km Run	*r* *p*	0.253* <0.001	0.011 0.861	0.131* 0.041	0.190* 0.003	0.574* <0.001

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Issues

- PT500 $\rightarrow$ muscular endurance, anaerobic and aerobic capacity
- Body drag not related to any test within the PT500
  - Moreno et al. (2019) – body drag correlated with vertical and standing broad jump in law enforcement recruits
- Recent law enforcement job task analyses indicated officers rate power, strength, and anaerobic capacity as more prevalent in job tasks than endurance and aerobic capacity (Gebhardt et al., 2008; Kruger, 2018)

Gebhardt, D. L., Baker, T. A., Polaki, J. (2008). Job analysis for the Los Angeles County Sheriff's Department patrol deputy assignment. Beltsville, MD: Human Performance Systems, Inc.
Krueger, K. California Commission on POST, Principal Consultant, personal communication, September 10, 2018.
Moreno, MR, Dulla, JM, Dawes, JJ, Orr, RM, Cesario, KA, and Lockie, RG. Lower-body power and its relationship with body drag velocity in law enforcement recruits. *Int J Exerc Sci* 12: 847-858, 2019.

Purpose of the Study

To determine relationships between a state-specific WSTB, with fitness measured by an agency-specific test battery called the PT500, and a novel battery involving power tests called the Validated Physical Ability Test+ (VPAT+) in Deputy Sheriff recruits.

Methods

- Retrospective analysis on five academy classes from one LEA that completed a 22-week training program was conducted
  - Males: 259 recruits (26.25 ± 4.76 years; 1.76 ± 0.08 m; 82.01 ± 13.24 kg)
  - Females: 49 recruits (26.45 ± 3.87 years; 1.63 ± 0.07 m; 67.28 ± 14.97 kg)
- The PT500, VPAT+, and WSTB were completed in the last weeks of the academy training period

WSTB

- Agility run around a 99-yard obstacle course (99OC)
- Body drag with a 165-pound dummy (BD)
- Climb over a six-foot chain link fence (CLF)
- Climb over a six-foot solid wall (SW)
- 500-yard run (500R)

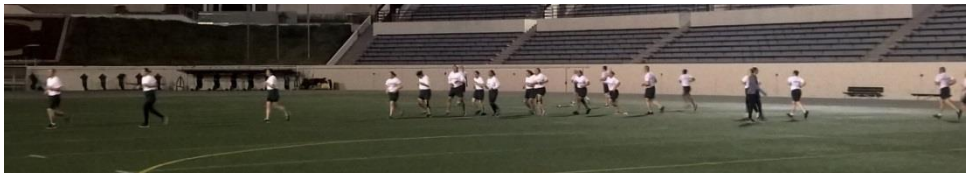
99-yard Obstacle Course

165-lb Body Drag

6-Foot Fence Climb

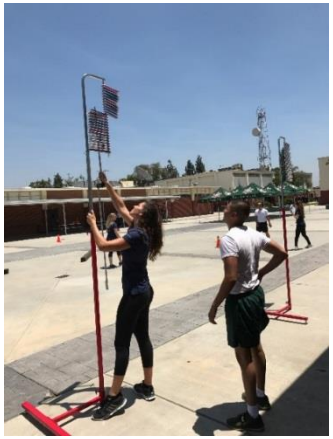
PT500

- Used to track changes in fitness during academy and determine fitness pin award
  - Maximum number of push-ups in 120 s
  - Maximum number of sit-ups in 120 s
  - Maximum number of mountain climbers in 120 s
  - Maximum number of pull-ups
  - 201-m (220-yard) run
  - 2.4-km (1.5-mile) run

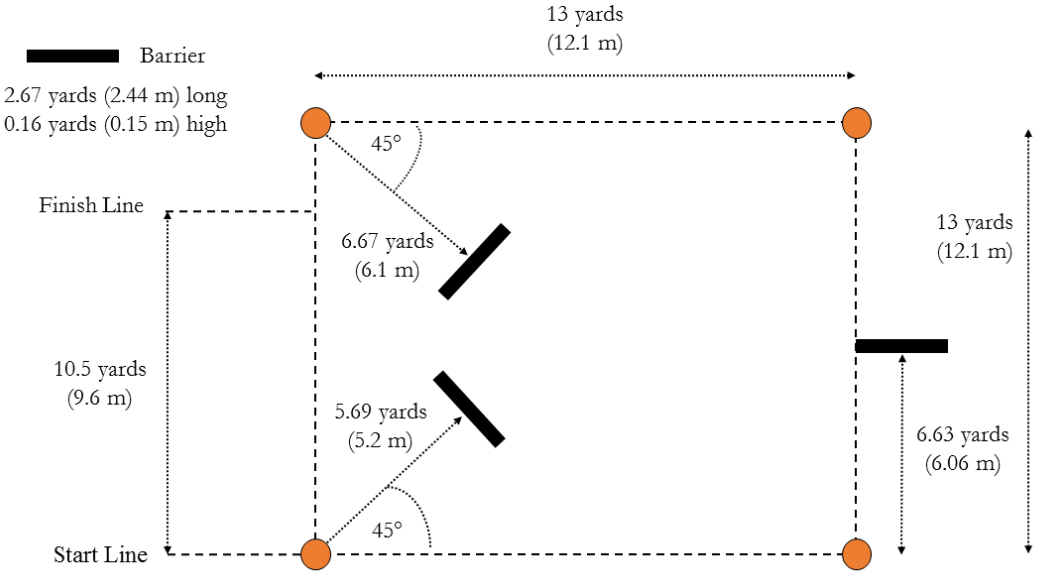


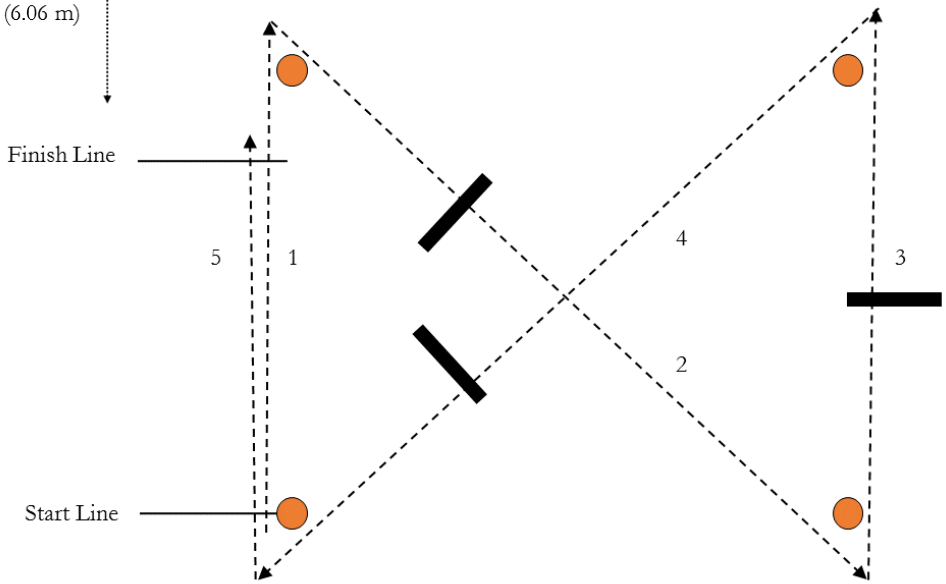
VPAT+

- Vertical jump (VJ)
- 2-kg seated medicine ball throw (MBT)
- 75-yard pursuit run (75PR)
- 20-m Multistage Fitness Test (MSFT)



75PR


Barrier
2.67 yards (2.44 m) long
0.16 yards (0.15 m) high
13 yards
(12.1 m)
45°
Finish Line
6.67 yards
(6.1 m)
13 yards
(12.1 m)
10.5 yards
(9.6 m)
5.69 yards
(5.2 m)
6.63 yards
(6.06 m)
45°
Start Line


Finish Line
5
1
4
3
2
Start Line

Statistical Analysis

- Partial correlations controlling for sex calculated relationships between the PT500 and VPAT+ with the WSTB
- Stepwise linear regression, with sex as a control variable, determined whether any of the VPAT+ and PT500 assessments predicted WSTB performance
  - Each WSTB task acted as a dependent variable; sex was included in all significant predictive relationships
- Significance set as $p \leq 0.05$ for all analyses

Results

		99OC	BD	CLF	SW	500R
Pull-ups	r	-0.33*	-0.02	-0.11*	-0.14*	-0.33*
	p	<0.01	0.77	0.05	0.01	<0.01
Push-ups	r	-0.26*	-0.01	-0.01	-0.03	-0.17*
	p	<0.01	0.82	0.98	0.60	<0.01
Sit-ups	r	-0.20*	-0.10	-0.08	-0.15*	-0.33*
	p	<0.01	0.08	0.17	0.01	<0.01
Mountain Climbers	r	-0.14*	-0.02	-0.04	-0.07	-0.29*
	p	0.02	0.77	0.53	0.25	<0.01
201-m Sprint	r	0.48*	0.05	0.26*	0.28*	0.44*
	p	<0.01	0.35	<0.01	<0.01	<0.01
2.4-km run	r	0.26*	0.03	0.05	0.08	0.54*
	p	<0.01	0.67	0.40	0.18	<0.01
VJ	r	-0.35*	-0.09	-0.25*	-0.25*	-0.21*
	p	<0.01	0.16	<0.01	<0.01	<0.01
75PR	r	0.53*	0.11*	0.35*	0.21*	-0.29*
	p	<0.01	0.05	<0.01	<0.01	<0.01
MBT	r	-0.26*	-0.10	-0.20*	-0.07	-0.04
	p	<0.01	0.10	<0.01	0.25	0.49
MSFT	r	-0.27*	-0.09	-0.13*	-0.13*	-0.438
	p	<0.01	0.13	0.02	0.02	<0.01

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	p	<0.01	0.10	<0.01	0.25	0.49
MSFT	r	-0.27*	-0.09	-0.13*	-0.13*	-0.43*
	p	<0.01	0.13	0.02	0.02	<0.01

Variables	*r*	r^2	*p*
99OC			
75PR	0.644	0.415	<0.001
75PR, 201-m Run	0.714	0.509	<0.001
75PR, 201-m Run, Push-ups	0.740	0.548	<0.001
75PR, 201-m Run, Push-ups, VJ	0.749	0.561	<0.001
75PR, 201-m Run, Push-ups, VJ, Mountain climbers	0.755	0.570	<0.001
BD			
75PR	0.297	0.088	<0.001
CLF			
75PR	0.543	0.295	<0.001
75PR, 201-m Run	0.562	0.316	<0.001
75PR, 201-m Run, VJ	0.573	0.329	<0.001
SW			
201-m Run	0.546	0.298	<0.001
201-m Run, VJ	0.569	0.324	<0.001
500R			
2.4 km Run	0.658	0.432	<0.001
2.4 km Run, 75PR	0.682	0.465	<0.001
2.4 km Run, 75PR, VJ	0.692	0.479	<0.001
2.4 km Run, 75PR, VJ, 201-m Run	0.697	0.486	<0.001

Conclusions

- Job-specific running assessments such as the 99OC and 500R require both aerobic and anaerobic capacities
- Reflected by the range of significant correlations and predictive relationships with the VPAT+ and PT500 assessments
- Those recruits that are generally more fit tend to be better at most physical assessments (Cesario et al., 2018)

Cesario, KA, Dulla, JM, Moreno, MR, Bloodgood, AM, Dawes, JJ, and Lockie, RG. Relationships between assessments in a physical ability test for law enforcement: Is there redundancy in certain assessments? *Int J Exerc Sci* 11: 1063-1073, 2018.

Conclusions

- The CLF and SW fence climb tasks had better relationships with assessments more reliant on power (VJ, MBT, 75PR, 201-m run) and strength (pull-ups)
- Similar results to Lockie et al. (2018), with the additional relationships indicated for lower-body (VJ: CLF and SW) and upper-body (MBT: CLF) power

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Conclusions

- However, strength of relationships tended to suggest there were important fitness qualities not currently being measured in recruits
- Notable when considering the body drag → weak relationships with 75PR only
  - Contrary to Moreno et al. (2019)
- What's missing? Absolute/maximal strength may be a more important quality for this task

Moreno, MR, Dulla, JM, Dawes, JJ, Orr, RM, Cesario, KA, and Lockie, RG. Lower-body power and its relationship with body drag velocity in law enforcement recruits. *Int J Exerc Sci* 12: 847-858, 2019.

Practical Applications

- LEA staff should ideally place greater emphasis on power training and assessment in recruits, in addition to the more traditional muscular endurance focus
  - Potentially greater application to job performance → maximal running and climbing tasks
- Training and measuring maximal strength should be explored, as this could relate to other essential job tasks
  - Body drag

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